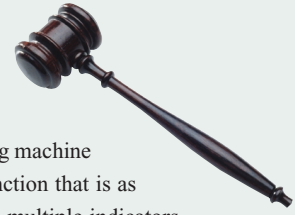


Relying on a Single Measurement – Guilty Until Proven Innocent



For many years, we've encouraged our customers to rely on multiple indicators when diagnosing machine problems. For example, a single plot type will rarely provide evidence of a particular malfunction that is as conclusive as when multiple plot types can be compared. Also, it is always desirable to have multiple indicators in agreement, such as temperature, position, vibration, pressure, and other conditions, when performing machinery diagnostics. It stands to reason that the more data you have to support a conclusion, the higher your confidence level will be.

However ...

The vibration, position, speed, and other parameters used as inputs to a machinery protection system are generally chosen because any one of them, by themselves, indicates a serious problem that typically merits a machine shutdown or at least an alarm without intervening voting with other parameters. For example, excessive motor winding temperature may not be accompanied by other indicators. Likewise, as noted in our Back to Basics article on page 51, thrust position is not always accompanied by a corresponding rise in bearing temperature. Certain radial vibration phenomena can result in excessive vibration at one bearing, or even one measurement plane, but not another. For these reasons, we do not advise that voting schemes be employed for machinery protection purposes except where *identical* measurements are being made (for example, thrust position where both probes are observing the same shaft movement or temperature measurements where both sensing elements are measuring the same part of the machine, such as a bearing pad or valve). X and Y radial probes, for example, are not identical measurements – they are observing separate planes of motion and we don't generally advise voting the alarms between these two channels. Obviously, if even X and Y channels can differ enough to make voting inadvisable, we likewise discourage voting channels from different bearings. In the quest to minimize false trips, such schemes generally mean that real machine problems can go undetected and lead to missed trips – a highly undesirable situation.

"Sometimes, customers are reluctant to rely on the information their vibration monitoring system is providing, because it may not be accompanied by other indicators."

Sometimes, customers are reluctant to rely on the information their vibration monitoring system is providing, because it may not be accompanied by other indicators. Some have even gone so far as to suggest that "Bently Nevada doesn't advocate relying on a single measurement." This is a misinterpretation of our position. To eliminate any possible confusion, what we *have* said is this:

When diagnosing a machine problem, it is rarely possible to determine the exact nature of the problem or its root cause when looking at only a single plot type or when looking only at a single transducer. However, even when a single transducer is indicating a machine problem, it is prudent to assume that the machine is malfunctioning, rather than the transducer, even if the exact nature of the machine problem cannot be determined.

It is important to remember that transducer problems generally do not generate signals that mimic real machinery problems. Even if a single transducer is indicating a machinery problem, pay attention to it and assume it is "telling the truth" until you have proven otherwise by a careful examination of the signal. Pay attention to it rather than dismissing it as "an instrument problem." Over the years, we have compiled many case histories where only one, or a few, of our transducers indicated a machinery problem while all other measurements on the machine were normal. In some cases, our measurements were ignored only to result in a machinery failure, or conditions were allowed to progress much longer than they should have. By the time other corroborating indicators appeared, the machine had sustained much more damage than it would have had our transducers' indications been heeded earlier.

With more robust transducers, monitoring systems capable of assessing their own health as well as that of connected transducers, and online machinery management software, you can rely more than ever on the integrity of the information Bently systems provide. Use multiple indicators when possible, but never ignore even a single indicator – it may be your first (and only) clue that a serious machine problem exists. 